PRELIMINARY TECHNOLOGY ASSESSMENT

Chemical-Free Water Treatment for Process Water

What is this Technology?

As water evaporates in open mechanical cooling systems, mineral content in the remaining water becomes increasingly concentrated. Allowed to accumulate, these minerals cause scaling and corrosion that can eventually clog and and cause system damage. Consequently, system water must be periodically flushed, known as "blowdown," to minimize mineral build-up. Chemicals are often used to minimize scaling and fouling, and to kill any dangerous microorganisms that may grow in the water. The chemical-free treatment under consideration, on the other hand, uses an electro-catalytic process to control scale, corrosion, and bio contamination, thereby reducing or eliminating the need for blowdown water and chemical decontaminants. Process water is passed through a series of electrolysis chambers that pull minerals from the water while simultaneously creating a natural biocide (hypochlorous acid and chlorine) that keeps the water clean. Scale accumulates in the easy-to-clean chambers instead of in hard-to-access process piping.

Why is GSA Interested?

By reducing the need for blowdown water, chemical free water treatment has the potential to reduce water use, while at the same time lowering chiller energy, reducing maintenance costs for water treatment, and eliminating the need to employ chemical decontaminants. This evaluation represents a significant extension of GPG's previous non-chemical water treatment evaluation (GPG Report 019), which assessed reduction of mineral buildup in domestic hot water systems only.

ENERGY EFFICIENCY Estimated chiller energy savings greater than 10%.

WATER SAVINGS The manufacturer estimates between 25% and 80% makeup water savings and 75% blowdown/sewer savings.

COST-EFFECTIVENESS Payback is estimated to be less than two years, assuming water and chemical savings, as well as energy saved by improved heat exchanger efficiency.

OPERATIONS & MAINTENANCE This technology eliminates the use of added chemicals. It also decreases maintenance costs and eliminates costs for mechanical cleaning & descaling. It promises to extend useful system life by minimizing scale and corrosion.

DEPLOYMENT POTENTIAL The technology can be retrofitted to any process water system, boiler, or other hot water system. It will be most cost-effective for cooling towers with at least a 200-ton capacity and for areas of high water stress and hard water, such as California, Nevada, Arizona, New Mexico, Utah, Colorado, Texas and Florida.

The Green Proving Ground program, in association with a federal laboratory, is subjecting chemical-free water treatment for process water to real-world measurement and verification in GSA buildings. Results will be published on the GPG website, www.gsa.gov/gpg.

GPG Green Proving Ground Program

The Green Proving Ground program leverages GSA's real estate portfolio to test innovative building technologies. The program helps GSA meet its sustainability goals by providing actionable data that informs investment decisions targeted at energy-use reduction.